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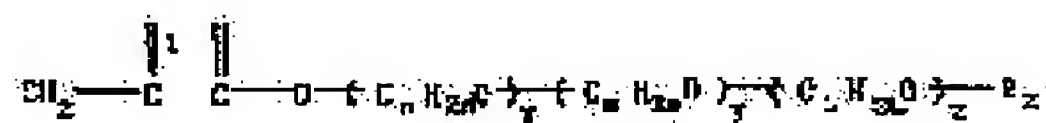
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KUBOTA HIDEMI(54) ACCEPTOR FOR WATER BASE INK, MATERIAL TO BE RECORDED USING THE SAME
ACCEPTOR AND INK JET RECORDING METHOD

(57)Abstract:

PURPOSE: To improve the feathering and to reduce mixed color blur by forming an acceptor for a water soluble ink of a heat reversible type shrink polymer containing a copolymer of a monomer of a water soluble polymer and a specific polymer monomer.

CONSTITUTION: An acceptor for a water base ink is formed of a heat reversible type shrink polymer made of a copolymer of a monomer composition containing total 50wt.% or more of one or more monomer of a water soluble polymer exhibiting thermosensitive behavior at the polymer and one or more monomers represented by the general formula [R1 is H, CH3, R2 is H, 1-30C alkyl group, phenyl group, aminoalkyl group, n is an integer of 2 to 5, m is an integer of 2 to 5, L is an integer of 2 to 5 (where n is not equal to m and m is not L), x is an integer of 2 to 50, y is an integer of 0 to 50, and z is an integer of 0 to 50]. The acceptor for the ink is laminated on a base to manufacture a material to be recorded.



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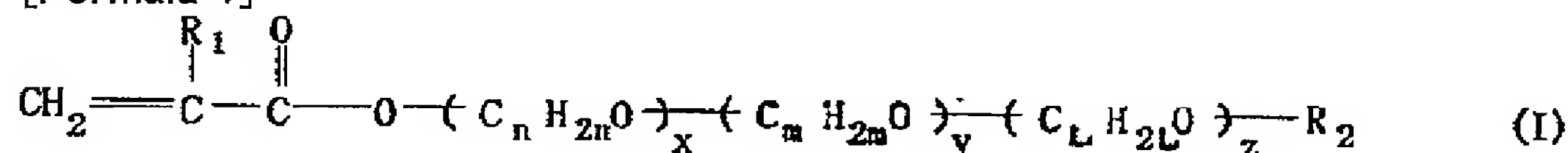
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CLAIMS

[Claim(s)]

[Claim 1] The acceptor for water color ink characterized by including the heat reversible mold shrinkage-characteristics macromolecule (macromolecule A) from which one or more monomers whose things which carried out the polymerization are the water soluble polymers in which sensible-heat behavior is shown, and one or more monomers expressed with the following general formula (I) made copolymerization perform, and were obtained with the monomer constituent contained a total of 50% of the weight or more.

[Formula 1]



(R1 expresses H or CH3 among the above-mentioned formula, and R2 expresses alkyl group [of the H; carbon numbers 1-30], alkylation, or non-permuted phenyl group;, alkylation, or a non-permuted amino alkyl group.) n — in the integer (however, the case of n=m and m=L is removed) of 2-5, and x, the integer of 2-50 and y express the integer of 0-50, and z expresses [the integer of 2-5, and m / the integer of 2-5, and L] the integer of 0-50.

[Claim 2] The acceptor for water color ink according to claim 1 whose monomer of the water soluble polymer in which sensible-heat behavior is shown is vinyl carboxylate of the alkylene oxide addition product of a nitrogen-containing heterocyclic compound which has active hydrogen.

[Claim 3] The acceptor for water color ink according to claim 1 or 2 which furthermore contains a particle.

[Claim 4] The acceptor for water color ink according to claim 1 or 2 which furthermore contains a sol.

[Claim 5] further — a basic compound — 0.01 – 10.0wt% — the acceptor for water color ink according to claim 1 to 4 to contain.

[Claim 6] further — a cationic compound — 0.01 – 10.0wt% — the acceptor for water color ink according to claim 1 to 4 to contain.

[Claim 7] x and z of the monomer shown by said general formula (I) are an equal acceptor for water color ink according to claim 1 to 6.

[Claim 8] said macromolecule A — more than 40wt% — the acceptor for water color ink according to claim 1 to 7 to contain.

[Claim 9] The acceptor for water color ink according to claim 1 to 8 in the range whose transition temperature which shows heat reversible mold contraction of said macromolecule A is 10 degrees C – 90 degrees C.

[Claim 10] The acceptor for water color ink according to claim 1 to 9 to which it comes to carry out the laminating of the two or more layers containing said macromolecule A with which transition temperature differs, respectively.

[Claim 11] The recorded material with which it comes to carry out the laminating of claim 1 thru/or one acceptor for water color ink of 10 on a base at least.

[Claim 12] The ink jet record approach which records on a recorded material according to claim 11 in the ink jet record approach which is made to breathe out the drop of ink including a record agent and a solvent object from the orifice of a recording head according to a record signal, and records on a recorded material.

[Claim 13] The ink jet record approach according to claim 12 which records by holding the temperature of a recorded material more than the transition temperature of an ink acceptor.

[Claim 14] The ink jet record approach according to claim 12 or 13 which records by making heat energy act on ink and making a drop breathe out.

[Claim 15] The ink jet record approach according to claim 12 or 13 which records by making mechanical energy act on ink and making a drop breathe out.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the acceptor for water color ink especially the acceptor for water color ink which uses ink in the regurgitation and the ink jet record which is made to fly and records by adhesion on the recorded material front face of the small drop of *** as a small drop from regurgitation RO (orifice), and the ink jet record approach using the acceptor.

[0002]

[Description of the Prior Art] Conventionally, usually to a writing implement, water color ink is used in respect of safety, an odor, etc., and the ink is constituted from various kinds of water soluble solvents, water soluble dye, or pigments etc. Moreover, as ink for ink jet record, fields, such as regurgitation ease, safety, and an odor, to water color ink is in use. Thousands of or more drop regurgitation is possible per second in ink, ink jet record has many advantages, like that high-speed record is easy, that there is little noise, that colorization is easy, that high-resolution-izing is possible, and regular paper record is possible, and this over [several years] spread is remarkable.

[0003] Furthermore, the demand of high coloring, high definition, high robustness, high resolution record, and high-speed record is increasing also about the image recording of a printer etc. in recent years by low-pricing of a personal computer, high-performance-izing, and standardization of the GUI environment. These advanced demands have the large place undertaken to the property of the recorded material which cannot be made satisfied only with amelioration of recording ink, such as ink, of a recorded material, but is used for record, i.e., an ink acceptor. However, the actual condition is that the ink acceptor to which all the above-mentioned demands are satisfied is not embodied an old place.

[0004] The proposal which raises the concentration of a record image to the former, for example, JP,57-173194,A, using the layer containing absorptivity resin and a macromolecule binder as an ink acceptor, makes ink absorption quick, and cleans the configuration of a record dot is made. Moreover, when effective in preparing the ink absorption layer containing the organic macromolecule particle swollen in the dissolution or ink in ink in a base material front face being proposed by JP,63-60784,A, and raising a blot of ink and drying [of a recording surface] to it, they are ** BE *****. Furthermore, in the Patent Publication Heisei No. 501658 [six to] official report, mixed use of the alkyl ether of 1 vinyl pyrrolidone, 2 polyester particle, 3 alkylene-oxide content polymer, 4PVA, and the structure of 5 specification etc. is carried out, an ink outflow is prevented, and the ink absorbing layer which cancels dot bleeding and obtains the record image of the Takamitsu study concentration is proposed.

[0005] As an example which, on the other hand, took in the change of state of an acceptance layer, by making the viscous water solution containing the charge of a coloring matter of a heat reversible macromolecule adhere in JP,63-237984,A on the macromolecule constituent held more than the phase transition temperature of the macromolecule, and forming an image, high-speed printing and improvement in coloring are realized, and it is supposed that a clear pattern will be acquired.

[0006]

[Problem(s) to be Solved by the Invention] However, in order to use absorptivity resin for above-mentioned JP,57-173194,A with the technique of an indication, the swelling of the acceptance layer by adhesion of water color ink occurs, and there is a problem on which an acceptance layer exfoliates from a base material. Moreover, the wettability and adhesion over various base materials of the absorptivity resin are not enough, and applicability is limited.

[0007] Although it is contingent [on a particle dissolving by adhesion of ink like the above with the technique of an indication] to JP,63-60784,A, the ** BE ***** organic particle is insoluble in water, and effectiveness is not looked at at all by the example at record by water color ink.

[0008] with a technique given in the Patent Publication Heisei No. 501658 [six to] official report, the fundamental configuration of the technique of an indication is improved by JP,57-173194,A in respect of ink absorbency — **** — although it does not pass but fixing to the acceptance layer of ink improves, the problem that the resistance over the exfoliation from a base material is inferior remains.

[0009] By the approach using a heat reversible macromolecule given in JP,63-237984,A, since the flow behavior of the macromolecule is reversible, it will bleed, if held more than transition temperature, and the effectiveness of prevention is accepted, but if the temperature is lowered below to transition temperature, in order that viscosity may fall and the fluidity of ink may come out, after being established, a blot of a record image occurs. if electrolytes (salt), such as NaCl, live together so much, since [furthermore,] the oxygen of the carbonyl group (C=O) used as the radix point of hydrogen bond will configurate preferentially the water soluble polymer water solution with a cloudy point like N-isopropyl acrylamide to sodium ion — heat — reversible gelation will not be caused. Even if this takes the approach of holding more than transition temperature in the osmosis process of the ink to the ink absorbing layer which used the macromolecule, for example, it will not show heat gelation by the color molecule which is sodium salt living together, and the semantics of it which uses the macromolecule for an ink absorbing layer is lost.

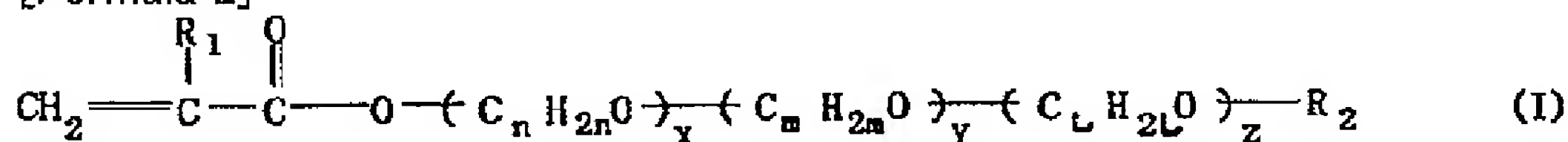
[0010] It is in offering the ink-jet record approach that high-definition record using the ink acceptor which can be carried out attaining to coincidence the improvement in a feather ring and color mixture blot (bleeding) reduction it is [reduction] indispensable to high definition record obtaining [accomplished, in order that this invention might solve the above-mentioned technical problem, and] high OD especially in ink jet record, the outstanding recorded material which has the acceptor, and such a recorded material can be performed.

[0011]

[Means for Solving the Problem] The acceptor for water color ink characterized by this invention containing the heat reversible mold shrinkage-characteristics macromolecule (macromolecule A) from which one or more monomers whose things which carried out the polymerization are the water soluble polymers in which sensible-heat behavior is shown, and one or more monomers expressed with the following general formula (I) made copolymerization perform, and were obtained with the monomer constituent contained a total of 50% of the weight or more is offered.

[0012]

[Formula 2]



R1 expresses H or CH3 among the above-mentioned formula, and R2 expresses alkyl group [of the H; carbon numbers 1-30], alkylation, or non-permuted phenyl group; alkylation, or a non-permuted amino alkyl group. n — in the integer (however, n=m — not but — and it is not m=L) of 2-5, and x, the integer of 2-50 and y express the integer of 0-50, and z expresses [the integer of 2-5, and m / the integer of 2-5, and L] the integer of 0-50.

[0013] Furthermore, this invention offers at least the recorded material with which it comes to

carry out the laminating of the above-mentioned acceptor for water color ink on a base.

[0014] Furthermore, this invention makes the drop of ink including a record agent and a solvent object breathe out from the orifice of a recording head according to a record signal, and offers the ink jet record approach which records on the above-mentioned recorded material.

[0015]

[Function] Hereafter, this invention is explained to a detail.

[0016] There is a heat reversible mold shrinkage-characteristics macromolecule in this invention in order to carry out gelation (thickening) contraction and to control osmosis diffusion of ink by being held more than the transition temperature, when water color ink starts the ink acceptor containing the macromolecule, contact, and osmosis. Addition of a particle or a sol gives a moderate opening to an acceptance layer, and has the effectiveness which raises ink rate of absorption. By making basicity or a cationic compound live together furthermore, the condition that osmosis diffusion of ink was controlled by the operation of a heat reversible mold shrinkage-characteristics macromolecule is frozen, namely, color-material components, such as a color, can be made into a water insolubility condition.

[0017] In order that transition temperature of a heat reversible mold shrinkage-characteristics giant molecule may be made higher than the environmental temperature (room temperature) usually used with a non-portable recording device like an ink jet recording device and may moreover make thickening by temperature effective (the temperature gradient before and after a change of state is enlarged), 10 degrees C or more its 90 degrees C or less are desirable. It must consider that the thermal resistance of a base material is 90 degrees C or more, and the application to an organic high polymer film etc. becomes difficult. Moreover, since it is less than the usual environmental temperature, effectiveness cannot fully be taken out with the transition temperature of 10 degrees C or less.

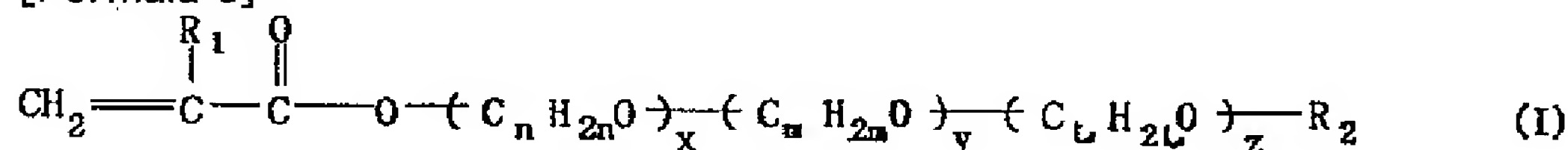
[0018] Next, the heat reversible mold shrinkage-characteristics macromolecule (A) used for the ink absorbing layer of this invention is described.

[0019] The macromolecule in which heat reversible mold shrinkage characteristics are shown is thickened above temperature (transition temperature) with fixed the water solution, water suspension, etc., and is a macromolecule with the reversible relation of temperature-viscosity (bibliography: Ito **** Atsuhiko Nitta, thermosetting resin, Vol.17, No.2, p.14, 1986), and various names, such as thermosensitive gel, temperature sensitivity gel, and a heat responsibility macromolecule, are used.

[0020] As mentioned above, with the monomer constituent which one or more monomers which are the water soluble polymers which what carried out the polymerization shows sensible-heat behavior, and one or more monomers expressed with the following general formula (I) contain a total of 50% of the weight or more, the heat reversible shrinkage-characteristics macromolecule (macromolecule A) of this invention makes copolymerization perform, and is obtained.

[0021]

[Formula 3]



However, R1 expresses H or CH3 among the above-mentioned formula, and R2 expresses alkyl group [of the H; carbon numbers 1-30], alkylation, or non-permuted phenyl group;, alkylation, or a non-permuted amino alkyl group. n -- in the integer (however, n=m -- not but -- and it is not m=L) of 2-5, and x, the integer of 2-50 and y express the integer of 0-50, and z expresses [the integer of 2-5, and m / the integer of 2-5, and L] the integer of 0-50.

[0022] The monomer whose thing which is said here, and which carried out the polymerization is the water soluble polymer in which thermosensitive is shown is a compound it has a compound and the part of a hydrophilic property, and a hydrophobic part in the intramolecular, and its N-alkylation vinyl system compound is typical.

[0023] Specifically N-ethyl acrylamide, N-cyclo propyl (meta) acrylamide, N-isopropyl (meta) acrylamide, N-n-propyl (meta) acrylamide, N-tetrahydro furil acrylamide, N-bitter taste roil

pyrrolidine, N-bitter taste roil piperidine, N-2-ethoxyethyl (meta) acrylamide, N-3-methoxy propyl (meta) acrylamide, N-3-ethoxy propyl (meta) acrylamide, N-3-isopropoxy propyl (meta) acrylamide, N-3-(2-methoxyethoxy) propyl (meta) acrylamide, N-1-methyl-2-methoxy ethyl (meta) acrylamide, N-1-methoxymethyl propyl (meta) acrylamide, N-methyl-N-ethyl acrylamide, N-methyl-N-isopropyl acrylamide, N-MECHIRU N-n-propyl acrylamide, N, and N-diethyl acrylamide, N-(2 and 2-dimethoxy ethyl)-N-methylacrylamide, N-(1, 3-dioxolane 2-ylmethyl)-N-methylacrylamide, The N-8-bitter taste roil -1, 4-dioxa-8-azaspiro [4, 5] Deccan, N-2-methoxy ethyl-N-ethyl acrylamide, N-2-methoxy ethyl-N-n-propyl acrylamide, N-2-methoxy ethyl-N-isopropyl acrylamide, N, and N-bis(2-methoxy ethyl) acrylamide, The methyl vinyl ether, 2-(2-methoxyethoxy) ethyl vinyl ether, 2-methyl-5-vinylpyridine, N-vinyl pyrrolidone, ethylene oxide, etc. are mentioned.

[0024] Furthermore, the monomer of the water soluble polymer in which the above-mentioned sensible-heat behavior is shown may be ester with the vinyl carboxylic acid of the alcohol which is the alkylene oxide addition product of the nitrogen-containing heterocyclic compound which has active hydrogen.

[0025] The nitrogen-containing heterocyclic compound which has active hydrogen is a compound which has the heterocycle which has nitrogen as a ring configuration element, and ***** which the hydrogen to combine ***** and can cause alkylene oxide and an addition reaction, and there are a saturation heterocyclic compound and a partial saturation heterocyclic compound.

[0026] As a nitrogen-containing saturation heterocyclic compound of them For example, the thing which has aziridine rings, such as an aziridine and 2-methylaziridine; A pyrrolidine, What has pyrrolidine rings, such as 2-methyl pyrrolidine, 2-pyrrolidone, and a succinimide; A piperidine, 2-methyl piperidine, 3, 5-dimethyl piperidine, 2-ethyl piperidine, The thing; 1-methyl piperazine which has piperidine rings, such as 4-piperidino piperidine, 4-pyrrolidino piperidine, and ethyl PIPEKORINETO, What has piperazine rings, such as a 1-methyl-3-ethyl piperazine; thing;, epsilon caprolactam, etc. which have morpholine rings, such as morpholine, 2-methyl morpholine, 3, and 5-dimethyl morpholine, are mentioned.

[0027] Next, as a nitrogen-containing partial saturation heterocyclic compound, 3-pyrroline, 2, 5-dimethyl 3-pyrroline, 2-hydroxypyridine, 4-pyridyl carbinol, a 2-hydroxy pyrimidine, etc. are mentioned, for example.

[0028] A thing desirable [among these] is a nitrogen-containing saturation heterocyclic compound, and are what has the thing and morpholine ring which have a piperidine ring still more preferably, and a thing which has a morpholine ring most preferably.

[0029] Moreover, as alkylene oxide in this invention, ethylene oxide, propylene oxide, and butylene oxide are suitable.

[0030] The transition temperature of said macromolecule in this invention can be easily adjusted by adjusting the class and the number of addition mols of alkylene oxide. For example, if it makes [many] the number of addition mols in using ethylene oxide, transition temperature will rise and, in the case of propylene oxide or butylene oxide, transition temperature will become low by the increment in the number of addition mols. As the number of addition mols of alkylene oxide, 1-20 mols are desirable and are 1-5 mols more preferably.

[0031] Since the part of the positive charge of a salt configures with the priority to ether oxygen even if a salt lives together as a function of the aforementioned monomer (I), since it has much ether oxygen in the molecule of the shape of the straight chain, it is not affecting the change of state of the macromolecule in which the heat reversible mold shrinkage characteristics described previously are shown. That is, a monomer (I) can raise the salt atmosphere of the macromolecule by leaps and bounds by copolymerizing with the macromolecule in which heat reversible mold shrinkage characteristics are shown.

[0032] A monomer (I) is the thing of the structure which alkylene oxide added to the vinyl system (meta) acrylic-acid monomer. omega 1 methoxy polyethylene-glycol monoacrylate, omega-methoxy polyethylene glycol monomethacrylate, omega 1 ethoxy polyethylene-glycol monoacrylate, omega 1 ethoxy polyethylene glycol monomethacrylate, Omega-n-propyl polyethylene-glycol monoacrylate, omega-n-propyl polyethylene glycol monomethacrylate, omega-isopropyl polyethylene-glycol monoacrylate, omega-isopropyl polyethylene glycol

monomethacrylate, Omega-n-butyl polyethylene-glycol monoacrylate, omega-n-butyl polyethylene glycol monomethacrylate, omega-isobutyl polyethylene-glycol monoacrylate, omega-isobutyl polyethylene glycol monomethacrylate, Omega-t-butyl polyethylene-glycol monoacrylate, omega-t-butyl polyethylene glycol monomethacrylate, omega-phenoxy polyethylene-glycol monoacrylate, omega-phenoxy polyethylene glycol monomethacrylate, Propylene glycol-polyethylene-glycol monoacrylate, (Pori) Propylene glycol-polyethylene glycol monomethacrylate, (Pori) omega-methoxy (Pori) propylene glycol-polyethylene-glycol monoacrylate, omega-methoxy (Pori) propylene glycol-polyethylene glycol monomethacrylate, Petit RENGU recall-polyethylene-glycol monoacrylate, (Pori) Butylene-glycol-polyethylene glycol monomethacrylate, (Pori) omega-methoxy (Pori) butylene-glycol-polyethylene-glycol monoacrylate, omega-methoxy (Pori) butylene-glycol-polyethylene glycol monomethacrylate, omega-methoxy (Pori) ethylene glycol-(Pori) propylene glycol-polyethylene-glycol monoacrylate, omega-methoxy (Pori) ethylene glycol-(Pori) propylene glycol-polyethylene glycol monomethacrylate, omega-hexyloxy polyethylene-glycol monochrome (meta) acrylate, Octadecyloxy polyethylene-glycol monochrome (meta) acrylate, omega-octyl phenyl (Pori) ethylene glycol-polypropylene-glycol monochrome (meta) acrylate, Nonyl phenyloxy (Pori) ethylene glycol-(Pori) propylene glycol-polyethylene-glycol monochrome (meta) acrylate, Polypropylene-glycol monochrome (meta) acrylate, omega-methoxy polybutylene glycol monochrome (meta) acrylate, omega-methoxy polytetramethylene glycol monochrome (meta) acrylate, omega-dimethylaminoethyl polyethylene-glycol monochrome (meta) acrylate, etc. are mentioned.

[0033] Next, a particle or a sol is made to contain, ink absorptivity can be raised and the ink acceptor of this invention can be made to shorten fixing time amount by giving a moderate opening to an ink absorbing layer in addition to the above-mentioned macromolecule.

[0034] Since such a particle is used considering preparing an opening as a main purpose, it can apply both an organic particle and a non-subtlety particle.

[0035] As an organic particle which can be used for this invention, a polyvinyl chloride, polyvinylidene chloride, vinyl chloride vinyl acetate copolymer, polyvinyl acetate, polystyrene, and styrene-acrylic-acid copolymer, styrene-maleic-acid copolymer, polyacrylic ester, polyacrylonitrile, styrene acrylonitrile copolymer, polycarbonate, polyamide, polyester, polyamide, polyvinyl-butyril, phenol resin, and styrene-divinylbenzene copolymer etc. can be mentioned.

[0036] As a non-subtlety particle which can be used for this invention, a kaolin, clay, the acid clay, talc, a silica, synthetic aluminum silicate, an alumina white, an aluminum hydroxide, a zeolite, titanium oxide, a calcium oxide, a zinc oxide, a magnesium oxide, cerium oxide, lanthanum oxide, boron oxide, an oxidization yttrium, a zirconium dioxide, a calcium carbonate, a magnesium carbonate, aluminum phosphate, calcium phosphate, etc. can be mentioned.

[0037] Moreover, alumina sol and a silica sol can be mentioned as a sol which can be used for this invention.

[0038] The ink acceptor of this invention may be made to contain basicity or a cationic compound furthermore in addition to the above-mentioned ingredient. Since such a compound is a molecule with an amide group, the amino group, an imino group, a quarternary-ammonium-salt radical, and an amino base and it is basicity or cationicity, it can combine with an anionic molecule from a color-material frame having a hydrogen bond radical like direct dye, and the solubility of a color is reduced. It has the effectiveness which, as a result, raises the water resisting property of a record object further.

[0039] As such basicity or a cationic compound A primary-amine hydrochloride ($R-NH_2$, HCl), a secondary-amine hydrochloride ($RR_1NH-HCl$), A tertiary-amine hydrochloride (RR_1R_2N-HCl), a benzalkonium salt like a lauryl dimethylbenzyl ammonium salt, Aliphatic series quarternary ammonium salt, such as benzethonium chloride like benzyl dimethyl 2-[2-[4-(1,1,3,3-tetramethylbutyl) phenoxy] ethoxy] ethylammonium chloride, Alkyl pyridinium salt, imidazolinium salt, the amphoteric surface active agent in which cationicity is shown by the acidity side, Carboxy betaine like a lauryldimethyl betaine, aminocarboxylate like a lauryl aminopropyl glycine, Imidazolinium betaine like 2-lauryl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine, Lecithin, cation-ized starch, the poly allylamine, polyvinyl imidazoline salt, Polly N, N-

dimethylaminoethyl (meta) acrylate, Polly N, N-dimethylaminoethyl (meta) acrylamide, Polly N, N-dimethylaminopropyl (meta) acrylamide, polyvinyl pyridine, Polyvinyl imidazole, cyanogen amide formaldehyde polycondensation, a cyanogen amide diethylenetriamine polycondensation object, An epichlorohydrin dimethylamine addition polymerization object, dimethyl allyl compound ammonium chloride, the 4th class salt polymerization object of dialkyl aminoethyl (meta) acrylate, etc. can be mentioned.

[0040] If the above basicity or a cationic compound has big effect on absorptivity and uses it for it too much so much, the problem on which an acceptance layer exfoliates from a base material for the swelling by water will come out of it. therefore — although a suitable amount must be chosen to the moisture content of the water color ink used for coincidence — desirable — the acceptor whole quantity — receiving — 0.005 – 15.0wt% — it is 0.01 – 10.0wt% more preferably.

[0041] in addition, the content of monomers, such as N-alkylation acrylamide which shows thermosensitive in order to make temperature width of face as small as possible by percentage which shows thermosensitive among the monomers which constitute the macromolecule (A) of this invention, such as N-alkylation acrylamide and acrylic ester (meta), since the temperature width of face of gelation (thickening) contraction changes, and acrylic ester (meta), — desirable — more than 30wt% — it is good to make it more desirable more than 50wt%.

[0042] To various kinds of base materials, the ink acceptor water solution which consists of the above configuration has very high wettability, and can form an ink acceptor on a base material easily by making a base material apply and dry a water solution as it is. For example, it is checked that the giant-molecule water solution of this invention soaks even the front face of PTFE (Pori ethylene tetrafluoride) well.

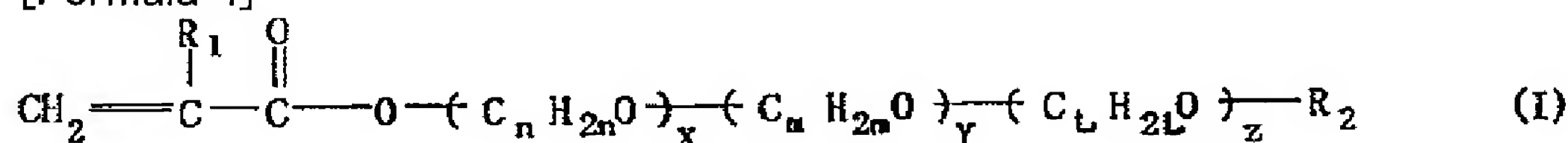
[0043] Next, the basic structure of the ink acceptor of this invention is explained.

[0044] In the following procedures, the ink acceptor of this invention was produced and the cross section was investigated. In addition, all the following "section" expressions show the weight section.

[0045] The 2 and 2'-azobis (2,4-dimethylvaleronitrile) 0.1 section was put into ampul, and the 2-morpholino ethoxy methacrylate (ester of one mol addition product [of a morpholine / of ethylene oxide] and methacrylic acid) 90 section and the (monomer I) of following structure 10 section were sealed after freezing degassing, and carried out the polymerization 60 degrees C for 8 hours, and the heat reversible mold shrinkage-characteristics giant molecule was obtained.

[0046]

[Formula 4]



The giant molecule was used as the 20wt(s)% water solution, and lauryl dimethylbenzyl ammonium salt 1wt% was further mixed as a cationic compound as a particle Japan Synthetic Rubber Co., Ltd. nature styrene-divinylbenzene dispersion-liquid (trade name: S2467) 2wt%, and on the PET film (Toray Industries, Inc. make : 100 micrometers in thickness), by the well-known roll coating method, it applied so that it might be set to 5g/m² by solid content. Next, the film which applied the acceptor was dried at 80 degrees C in oven for 3 hours, and the transparency film for water color ink was obtained. The cross-section structure is roughly shown in drawing 1 .

[0047] One is a particle and a PET film a heat reversible mold shrinkage-characteristics giant molecule (a cationic compound is included) and whose 4 2 is base materials as for an opening and 3 among drawing 1 .

[0048] By the way, the ink acceptor of this invention applies and uses a water solution as it is, and also although it constructs a bridge in a macromolecule and is a hydrophilic property, it is good as physical properties which are water-insoluble nature. In this case, a bridge is constructed by a well-known hydrophilic cross linking agent, i.e., polyhydric alcohol, multiple-valued glycidylethers, the halo epoxy compound, the multiple-valued aldehyde, multiple-valued amines, and polyvalent metallic salt, or multiple bond nature machines, such as a vinyl group and

an acryloyl radical, are introduced into some giant molecules, and ultraviolet curing may be carried out. Generally the amount of these cross linking agents used is about 0.001 mol %–1.0 mol % to a monomer.

[0049] Furthermore, the ink acceptor of this invention can change the depth of penetration to the acceptor of record agents, such as ink, if whenever [stoving temperature / of an acceptor] is appropriately controlled by considering as the multilayer configuration which consists of two or more layers containing the heat reversible mold shrinkage-characteristics macromolecule with which transition temperature differs, respectively. For example, since ink can permeate from a base material side to the upper part of a layer 1 if temperature T of an acceptor is made into $TA < T < TB$ when transition temperature is the acceptor of the two-layer configuration which are TA (layer 1) and TB (layer 2) ($TB > TA$), respectively, a record object becomes that to which the clear coat of the front face was carried out, and can expect a new visual effect.

[0050] By the way, since water color ink is targetted for the ink acceptor of this invention, it is effective for use by ink jet record. Although there are a record approach which mechanical energy is made to act on ink and carries out the regurgitation of the drop as the ink jet record approach, and the record approach which adds heat energy to ink and carries out the regurgitation of the drop by foaming of ink, since the ink used also in which approach has fields, such as handling nature, safety, and opposite environment nature, to water color ink in use, especially the ink acceptor of this invention is suitable for those record approaches.

[0051] Next, the ink jet recording device used for this invention is explained.

[0052] First, the example of a head configuration which is the principal part using heat energy of equipment as an ink jet recording device is shown in drawing 2 and drawing 3. Drawing of longitudinal section where drawing 2 met the ink passage of the head section of an ink jet recording device, and drawing 3 are the X–Y sectional view and a perspective view of the example of a head which has two or more nozzles.

[0053] In these drawings, a head 21 pastes up the glass and the ceramic which have the passage (nozzle) 22 which lets ink pass, silicon or a plastic sheet, and the heater element substrate 23, and is obtained. electrode 5; formed by the protective layer 24; aluminum in which the heater element substrate 23 is formed with silicon oxide, silicon nitride, carbonization silicon, etc., gold, the aluminum–copper alloy, aluminum–Si, etc. -- it consists of the substrate 8 formed with the good ingredient of heat-dissipation nature, such as accumulation layer 7; silicon formed with the exoergic resistor layer 6; thermal oxidation silicon formed from refractory materials, such as HfB_2 , TaN, TaAl, and Pori Si and TaSi, an aluminum oxide, etc., aluminum, and aluminum nitride. In addition, if corrosion-resistant metal layer 24a, such as Ta, Nb, nickel, Pt, and Ir, is prepared as an up layer of a protective layer 24, the effectiveness that the endurance of a recording head improves further will be acquired.

[0054] If a pulse-like electrical signal is impressed to the electrode 5 of the above-mentioned head, the field shown by h of the heater element substrate 23 generates heat quickly, and by the pressure which air bubbles generate in the ink which is in contact with this front face, and is generated by it, a meniscus 10 will let a projection pass, ink will let the nozzle 2 of a head pass, and it will become the record smallness drop 12 from discharge and an orifice 11, and will fly toward a recorded material 13. The external view of the multi-head which put in order many heads shown in drawing 2 is shown in drawing 4.

[0055] One example of the ink jet recording device which included this head in drawing 5 is shown.

[0056] In drawing 5, 61 is a blade as a wiping member, maintenance immobilization is carried out by the blade attachment component, and the end makes the gestalt of a cantilever. A blade 61 is arranged in the location which adjoined record **** by the recording head, moves in the direction perpendicular to the migration direction of a recording head, contacts a regurgitation RO side, and is equipped with the configuration which performs capping. Further 63 is an ink absorber which adjoins a blade 61 and is formed, and is held like a blade 61 with the gestalt projected in the moving trucking of a recording head. The regurgitation recovery section 64 is constituted by the above-mentioned blade 61, cap 62, and the absorber 63, and removal of the moisture in a regurgitation RO side, dust, etc. is performed by a blade 61 and the absorber 63.

[0057] The recording head which records on the recorded material which counters the regurgitation RO side which 65 has a regurgitation energy generation means and allotted regurgitation RO by breathing out ink, and 66 are the carriage for carrying a recording head 65 and moving a recording head 65. Carriage 66 engaged with the guide shaft 67 possible [sliding], and has connected a part of carriage 66 with the belt 69 driven by the motor 68 (un-illustrating). Thereby, carriage 66 becomes movable [in alignment with the guide shaft 67], and becomes movable [the record section by the recording head 65, and its adjoining ****]. The feed section for 51 to insert a recorded material and 52 are paper feed rollers driven by the non-illustrated motor. Paper is delivered to the delivery unit which arranged the delivery roller 53 as a recorded material is fed to the regurgitation RO side of a recording head, and the location which counters by these configurations and record advances by them. In case a recording head 65 carries out record termination and returns to a home position in the above configuration, the cap 62 of the head recovery section 64 has projected the blade 61 in moving trucking, although it has evacuated from the moving trucking of a recording head 65. Consequently, wiping of regurgitation RO of the **** head 65 is carried out. In addition, when cap 62 performs capping in contact with the regurgitation side of a recording head 65, cap 62 moves so that it may project in the moving trucking of a recording head. When a recording head 65 moves to a recording start location from a home position, cap 62 and a blade 61 are in the same location as the location at the time of the above-mentioned wiping. Consequently, also in this migration, wiping of the regurgitation RO side of a recording head 65 is carried out.

[0058] Migration at the home position of an above-mentioned recording head moves to the home position which adjoined the record section at the predetermined spacing, not only the time of record termination and regurgitation recovery but while moving in a record section for record of a recording head, and the above-mentioned wiping is performed with this migration.

[0059] Drawing 6 is drawing showing one example of the ink cartridge which held the ink supplied to a recording head through ink feed zone material, for example, a tube. 40 is the ink hold section which contained the ink for supply, for example, an ink bag, and the plug 42 made of rubber is formed at the tip here. By inserting a needle (un-illustrating) in this plug 42, the ink in the ink bag 40 is closed, if supply on a head is possible. 44 is an ink absorber which receives waste ink. That in which the liquid-facing surface with ink is formed with polyolefine, especially polyethylene as the ink hold section is desirable.

[0060] It is used suitable not only for that from which the head and the ink cartridge became another object as mentioned above but the thing with which they as show drawing 7 were united as an ink jet recording apparatus used by this invention. In drawing 7, 70 is a record unit, the ink hold section which held ink into this, for example, an ink absorber, is contained, and the ink in this ink absorber has composition breathed out as an ink droplet from the head section 71 which has two or more orifices. It is desirable for this invention to use polyurethane as an ingredient of an ink absorber. Moreover, structure which is the ink bag with which the ink hold section taught the spring etc. to the interior not using the ink absorber is sufficient. 72 is atmospheric-air free passage RO for making atmospheric air open the interior of a cartridge for free passage. This record unit 70 is changed and used for the recording head shown in drawing 4, and attachment and detachment of it are attained to carriage 66.

[0061] Next, it can have ink which fills the perimeter of the nozzle formation substrate which has two or more nozzles as the 2nd gestalt of an ink jet recording device, the pressure generating component which consists of piezoelectric material which counters a nozzle and is arranged, and an electrical conducting material, and said pressure generating component, and the on-demand ink jet recording head which carries out the variation rate of the pressure generating component with applied voltage, and makes the small drop of ink breathe out from a nozzle can be mentioned.

[0062] The example of a configuration of the recording head which is a part for the principal part of the recording device is shown in drawing 8.

[0063] The head consists of the ink passage 80 which was open for free passage in the ink room (un-illustrating), the orifice plate 81 for carrying out the regurgitation of the ink droplet of the desired volume, a diaphragm 82 which makes a direct pressure act on ink, a piezoelectric device

83 which it is joined to the diaphragm 82 and displaced with an electrical signal, and a base 84 for carrying out support immobilization of a piezoelectric device 83, an orifice plate 81, and the diaphragm 82 grade.

[0064] In drawing 8, the ink passage 80 is formed with a photopolymer etc., regurgitation RO 85 is formed by punching by electrocasting and the press to metals, such as stainless steel and nickel, and laser processing etc., a diaphragm 82 is formed in an orifice plate 81 with a metal film, high elasticity resin films, etc., such as stainless steel, nickel, and titanium, and a piezoelectric device 83 is formed in it with dielectric materials, such as barium titanate and PZT.

[0065] The recording head of the above configurations gives a pulse-like electrical potential difference to a piezoelectric device 83, generates strain stress, and is made to transform the diaphragm with which the energy was joined to the piezoelectric device, and the ink in ink passage is pressurized perpendicularly, and it operates so that it may record by breathing out an ink droplet from regurgitation RO 85 of an orifice plate.

[0066] This recording head is used including in the same recording device as what was shown in drawing 5. Actuation of the details of a recording device is not performed like point **, and does not interfere.

[0067]

[Example] Next, an example and the example of a comparison are given and this invention is explained concretely. In addition, especially a presentation-among sentence ratio is weight % as long as there is no notice.

[0068] (Examples 1-12)

[0069]

[Table 1]

高分子 記号	単量体 (重量%)	分子量	転移温度 (℃)
A	N-エチルメタクリルアミド (90) メトキシエチレングリコールモノ メタクリレート (10)	800,000	5 1
B	N-イソブチルメタクリルアミド (90) メトキシテトラエチレングリコールモノ メタクリレート (10)	1,000,000	3 2
C	2-エチルヘキシルメタクリレート (92) ヘキシルグリセリントリメタクリレート * (6) メタクリル酸 (2)	500,000	4 5
D	N-2-エトキシエチルメタクリルアミド (93) ヘキシルトリメタクリレート * (7)	200,000	4 7

[0070]

[Table 2]

高分子 記号	単量体 (重量%)	分子量	転移温度 (°C)
E	N-アクリルヒドロキシ (93) ホリエチレングリコールモノメタクリレート* (5) メタクリル酸 (2)	500,000	56
F	N-1-メトキシメチルプロピル アクリルアミド* (95) ホリブチレングリコール-ホリ リエチレングリコールモノメタクリ レート* (5)	500,000	12
G	2-モルホリノエチルメタクリレート (90) ω -メトキシホリエチレングリコ ール-ホリブプロピレングリコ ール-ホリエチレングリコールモ ノメタクリレート* (10)	700,000	43
H	2-(2-メトキシエトキシ)エチル ヒドリエーテル (90) ω -メトキシテトラエチレングリコ ールモノメタクリレート (10)	500,000	70

[0071]

[Table 3]

高分子 記号	単量体 (重量%)	分子量	転移温度 (℃)
I	2-モルホリノプロピルメタクリレート (90) ω-メトキシテトラエチレングリコ ールモノメタクリレート (10)	600,000	19
J	N,N-ビス(2-メトキシエチル) アクリルアミド (90) N,N-ジメチルアミノプロピル アクリレート (5) ω-メトキシテトラエチレングリコ ールモノメタクリレート (5)	200,000	38
K	2-モルホリノエチルメタクリレート (85) フェノキシテトラエチレングリコール モノメタクリレート (5) ω-メトキシテトラエチレングリコ ールモノメタクリレート (10)	200,000	42
L	N-(2,2-ジメトキシエチル) -N-メチルアクリルアミド (90) ω-ジメチルアミノエチルホリス チレングリコールモノメタクリレート * (10)	400,000	61

Alkylene oxide of the monomer (what gave notation *) which forms each macromolecule among the notes table 1-3 (the number of addition mols of alkylene glycol is as follows.)

Macromolecule C: Propylene oxide = 3, the ethylene oxide = 7 macromolecule D And F : butylene oxide = 5, ethylene oxide = 10 giant-molecule E:ethylene oxide = 9 giant-molecule G:ethylene oxide = 10, and the presentation and property of a monomer that carry out propylene oxide = 22 giant-molecule L:ethylene oxide = 23 copolymerization It uses macromolecule A-L (heat reversible shrinkage-characteristics macromolecule), the ion-exchange-water water solution of the heat reversible shrinkage-characteristics macromolecule of suitable concentration (15 - 20%) is prepared beforehand, respectively, and the recorded material which established the ink acceptor in the procedure which was shown in Tables 1-3, and which is described below was created.

[0072] It adds stirring in order of a particle (dispersion liquid), basicity, or a cationic compound water solution if needed in a giant-molecule water solution, and prepares to the predetermined concentration of a class product. After stirring for 3 hours, the solution was applied so that it might become 5 g/m² by solid content to a base material front face by the roll coating method, and it dried below with transition temperature for 10 hours, and the recorded material of examples 1-12 with which the ink acceptor of this invention was established was produced. Moreover, the water solution which carried out additional mixing and obtained the cross linking agent in some examples was applied like the above, and 100 degrees C carried out heating bridge formation for 24 hours.

[0073] Those ink acceptors, the production conditions of a recorded material, etc. were summarized in Table 4 and 5.

[0074]

[Table 4]

成分	実施例 1	実施例 2	実施例 3	実施例 4	実施例 5	実施例 6
高分子の種類	A	B	C	D	E	F
高分子の添加量	10.0	5.0	10.0	15.0	10.0	10.0
微粒子分散液1) 添加量	2.0	2.0	2.0	2.0	2.0	2.0
塩基性／カチオン性物質	塩化ベンザルコニウム 2)	塩化ベンザルコニウム 2)	ホリエチレン ホリアミン 3)	ホリエチレン ホリアミン 3)	ホリエチレン ホリアミン 3)	塩化ベンザルコニウム 2)
塩基性／カチオン性物質添加量	1.0	1.0	0.5	0.5	0.5	0.5
イオン交換水	残部	残部	残部	残部	残部	残部
基材	PET フィルム (厚さ 100 μ m)	PET フィルム (厚さ 100 μ m)	PET フィルム (厚さ 100 μ m)	Al板 (厚さ 0.2mm)	Al板 (厚さ 0.2mm)	Al板 (厚さ 0.2mm)

[0075]

[Table 5]

成分	実施例 7	実施例 8	実施例 9	実施例 10	実施例 11	実施例 12
高分子の種類	G	H	I	J	K	L
高分子の添加量	10.0	10.0	10.0	15.0	15.0	10.0
微粒子分散液4) 添加量	2.0	2.0	2.0	2.0	2.0	2.0
塩基性／カチオン性物質	塩化ベンザルコニウム 2)	塩化ベンザルコニウム 2)	塩酸アルキルアミノエチル クワリツソ5)	塩酸アルキルアミノエチル クワリツソ5)	ホリエチレン ホリアミン 3)	塩化ベンザルコニウム 2)
塩基性／カチオン性物質添加量	1.0	1.0	1.0	1.0	5.0	5.0
イオン交換水	残部	残部	残部	残部	残部	残部
基材	アクリル板 (厚さ 0.2mm)	アクリル板 (厚さ 0.2mm)	アクリル板 (厚さ 0.2mm)	Al板 (厚さ 0.2mm)	Al板 (厚さ 0.2mm)	Al板 (厚さ 0.2mm)

1) Particle dispersion-liquid [by Japan Synthetic Rubber Co., Ltd.] S2467U (8% of solid content)

2) the cation G-403 by Sanyo Chemical Industries, Ltd. -- the product made from PNF-704 Nissan Chemistry made from Japanese Flower Chemistry -- the mixed liquor same on a REBON [by alumina sol-1005 Sanyo Chemical Industries, Ltd.] T-2(example 13) PET film (Toray Industries make; 100 micrometers in thickness) as an example 7 It applied so that it might become 3 g/m² in a roll coater, after desiccation, it applied and dried so that it might become 2 g/m² about the still more nearly same mixed liquor as an example 8, and the recorded material which established the ink acceptor of a two-layer configuration was obtained.

[0076] (Example 14) Addition mixing of the diethylene-glycol diglycidyl ether (Nagase Brothers

formation make) was carried out at 1.0wt(s)% at the same mixed liquor as an example 3, it applied so that it might be set to 5g/m² at a polyarylate film (75 micrometers in Elmec F-1100, Kaneka, thickness), and heating bridge formation was carried out at 100 degrees C for 5 hours, and the recorded material with which the ink acceptor was established was produced.

[0077] (Examples 1-5 of a comparison) For the comparison, 10% [of absorptivity resin which is the resultant of cellulose, acrylic-acid, N and N-methylenebis acrylamide], and polyvinyl alcohol 2%, it applied to the PET film by the roll coater, and the coating liquid (solution of the example 1-2 of JP,56-173194,A) which consists of 88% of water was dried so that it might be set to 5g/m², and the recorded material of the example 1 of a comparison was produced.

[0078] It applied to the same acrylic board as what used the same coating liquid in the example 7, and the recorded material of the example 2 of a comparison was obtained.

[0079] It applied to the same aluminum plate as what used the still more nearly same coating liquid in the example 10, and the recorded material of the example 3 of a comparison was obtained.

[0080] Furthermore, 10% water solution of the resultant (molecular weight 300000, transition temperature of 31 degrees C; heat reversible macromolecule given in JP,63-237984,A) of N-isopropyl acrylamide was applied so that it might become a PET film with 5 g/m², and it dried, and the recorded record material of the example 4 of a comparison was produced.

[0081] The same coating liquid was applied so that it might become the same base material (polyarylate film) as an example 14 with 5g/m², and it was dried, and it considered as the recorded material of the example 5 of a comparison.

[0082] ink jet record -- service water -- the mixed liquor shown below as water color ink for preparation evaluation of sex ink -- preparing -- ink jet record -- service water -- it considered as sex ink (black ink and cyanogen ink).

(Black ink)

Color: C.I.Direct Black19 2% Solvent: Diethylene glycol 20% Water 78% (cyanogen ink)

Color: C.I.Direct Blue15 2% Solvent: Diethylene glycol 20% Water: The performance evaluation was performed using 78% or more of ink about the recorded materials of each of examples 1-14 and the examples 1-2 of a comparison.

[0083] The performance-evaluation item was considered as the evaluation of four items of the adhesion condition to the base material of 1 optical density (OD value), 2 feather ring, 3 bleeding, and the ink acceptor after 4 records as an object for ink jet record.

[0084] these the evaluations of any -- the constant temperature of the temperature of 23 degrees C, and 60% of humidity -- it carried out by the laboratory. In addition, about evaluation criteria 1, 2, and 4, it considered only as the case of black ink, and evaluation criteria 3 were taken as color ink.

[0085] Appraisal method 1 optical density (OD value)

To the recorded material of A4 size, the pattern with the five solid sections was printed with the square of 5mm around, and optical density was measured about the print sample after 30-minute or more progress. The concentration of the five solid sections was measured with the Macbeth reflection density plan RD 914 in the print image, and the average was made into OD value. In addition, the amount of ink placing of the solid section is 2 12 nl(s)/mm.

[0086] 2) The dot thinned out every other [of the nozzle of a recording head] was recorded on the ink acceptor of feather ring A4 size, the dot of the print sample which passed 30 minutes or more was observed with the magnifier, and it evaluated in the following five steps.

[0087] 5: dot 4: of a perfect circle -- the evaluation pattern shown in dot 3 bleeding drawing 9 without the part of the dot 1: radii which are transforming whether a blot is seen by three fourths of the dot 2: peripheries which are transforming whether a blot is seen by one half of the dot 3: peripheries which are transforming whether a blot is seen by one fourth of peripheries was prepared. The level of bleeding is divided into five steps, and from 2 color boundary sections (line of an arrow head), a color mixture blot makes it the level of pulley DINGU to the location of which line to generate, and evaluates five steps (the case where bleeding had stopped within 1-dot Rhine from the boundary line was set to 5, and the score was carried out by 4, 3, 2, or 1 by to which Rhine bleeding occurred below). The A section in drawing is a black color, the B section

is the printing pattern of a cyanogen color, the line of a both-ends arrow head shows the boundary of two colors, and five lines is recorded at intervals of 1-dot Rhine / 1-dot tooth space.

[0088] 4) After recording on the 150x230mm field of the recorded material for evaluation of A4 size in the black ink shown in the adhesion condition point to the base material of the ink acceptor after record and seasoning naturally the printing object for 24 hours, viewing and a finger touched and estimated the adhesion condition to the base material of an ink acceptor. Although exfoliation was looked at by O and the part in the case where an adhesion condition is good, the case where exfoliation was seen in the case where there are few problems practically in ** and large area was made into x.

[0089] BJC600 (360dpi) by Canon, Inc. was used as a recording device used for evaluation of ink jet record of the account 1-4 of evaluation on board. Supply of ink used the approach of filling up an exclusive ink container with target ink. In addition, BJC600 is incorporated in the device in which a form is heated, during record. The outline was shown in drawing 10 . The recording device of drawing 10 installs a heating element 100 in the fundamental recording device of drawing 5 . It is what arranged 20 P-8010 made from Japanese earthenware thermal heads 101 in A4 breadth, and a heating element 100 is 2 applied-voltage 19V and 56W [/mm] impression power, and can heat paper skin temperature in 30-140 degrees C with the environmental temperature of 23 degrees C by adjusting driving pulse width of face and drive frequency.

[0090] In evaluation, the heating element of a recording device was adjusted in transition temperature of +8 degrees C of a heat reversible mold shrinkage-characteristics macromolecule by which paper skin temperature is contained in the ink acceptor of the recorded material of each example or the example of a comparison (the distance on a heating element front face and the front face of a form is 0.5mm). In addition, about the recorded material of an example 13, the heating device was adjusted and estimated that the skin temperature of an ink acceptor becomes 55 degrees C.

[0091] Furthermore, separately, about the same recorded material as an example 1, the heating device was intercepted and evaluations 1-4 were carried out. Moreover, evaluation of the recorded material of the examples 1-3 of a comparison was performed by intercepting the heating device of this evaluator. About the examples 4 and 5 of a comparison, it adjusted and it was estimated that the front face of an ink acceptor became 40 degrees C.

[0092] The result of the above evaluation was collectively shown in Table 6.

[0093]

[Table 6]

被記録材	OD	フェザリング	ブリーディング	密着状態
実施例 1	1.39	5	5	◎
実施例 1 ¹⁾	1.25	3	3	◎
実施例 2	1.40	4	5	◎
実施例 3	1.38	5	5	◎
実施例 4	1.43	5	4	◎
実施例 5	1.40	5	5	◎
実施例 6	1.41	5	5	◎
実施例 7	1.39	5	5	◎
実施例 8	1.41	4	5	◎
実施例 9	1.45	5	5	◎
実施例10	1.43	5	4	◎
実施例11	1.39	5	4	◎
実施例12	1.41	5	4	◎
実施例13 ²⁾	1.47	5	5	◎
実施例14	1.40	5	5	◎
比較例 1	1.20	3	3	△
比較例 2	1.19	3	3	×
比較例 3	1.21	3	3	×
比較例 4	1.26	4	2	△
比較例 5	1.27	4	2	×

1) It evaluated by intercepting a heating device.

2) The printing object in this case was the hand to which the clear coat of the front face was carried out.

[0094] The result shown in Table 6 shows that feather ring nature and bleeding nature are conventionally superior to ink, the ink acceptor of this invention maintaining high OD. Moreover, since it set to this invention and the change of state more than the transition temperature of a heat reversible mold shrinkage-characteristics macromolecule is used from the result of two kinds of evaluations with the case where the case where there is a heating function and heating device in the recorded material of an example 1 are intercepted as shown in Table 6, it is carry out an ink acceptor more than the transition temperature of the macromolecule at the time of record, and it is clear that the large improvement in the record engine performance can be attained. Moreover, from the height of the wettability over various base materials, the ink acceptor of this invention is excellent in adhesion, and can also check that applicability is expanded conventionally.

[0095] Even if it applies the conventional heat reversible macromolecule to an ink acceptor as it is like the example 4 of a comparison to it, in the condition that a color lives together, an operation of a heat shrink etc. is controlled and it turns out that printing grace is low.

[0096]

[Effect of the Invention] As explained above, since heat shrink control of the macromolecule by the color contained in recording ink can be eliminated, by the ink jet record approach using the ink acceptor of this invention, the improvement in a feather ring and color mixture blot (bleeding) reduction it is [reduction] indispensable to high definition record can be attained to coincidence, obtaining high OD.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the typical sectional view of one example of the recorded material using the ink acceptor of this invention.

[Drawing 2] It is drawing of longitudinal section of the head section using heat energy of one example of an ink jet recording device.

[Drawing 3] It is the X-Y sectional view of the head section of drawing 2 .

[Drawing 4] It is the perspective view of one example of a head which has two or more nozzles of an ink jet recording device.

[Drawing 5] It is the perspective view of one example of an ink jet recording device.

[Drawing 6] It is drawing of longitudinal section showing one example of an ink cartridge.

[Drawing 7] It is the perspective view of one example of the ink jet recording head which was united with the ink cartridge.

[Drawing 8] It is drawing of longitudinal section of one example of the head of the ink jet recording device using a piezoelectric device.

[Drawing 9] It is drawing showing the evaluation pattern of bleeding used in the example and the example of a comparison.

[Drawing 10] It is the perspective view showing one example of an ink jet recording device which prepared the heating element.

[Description of Notations]

1 Particle

2 Opening

3 Heat Reversible Mold Shrinkage-Characteristics Macromolecule

4 Base Material

5 Electrode

6 Exoergic Resistor Layer

7 Accumulation Layer

8 Substrate

10 Meniscus

11 Orifice

12 Drop

13 Recorded Material

21 Head

22 Passage (Nozzle)

23 Heater Element Substrate

24 Protective Layer

24a Corrosion-resistant metal layer

40 Ink Hold Section

42 Rubber Stopper

44 Ink Absorber

51 Feed Section

52 Paper Feed Roller

53 Delivery Roller
61 Wiping Member (Blade)
62 Cap
63 Ink Absorber
64 Regurgitation Recovery Section
65 Ink Jet Recording Head
66 Carriage
67 Carriage Guide Shaft
68 Carriage Mechanical Component (Motor)
69 Belt Section for Drive
70 Record Unit
71 Head Section
72 Atmospheric-Air Free Passage Opening
80 Ink Passage
81 Orifice Plate
82 Diaphragm
83 Piezoelectric Device
84 Base
85 Delivery
100 Heating Element
101 Thermal Head

[Translation done.]

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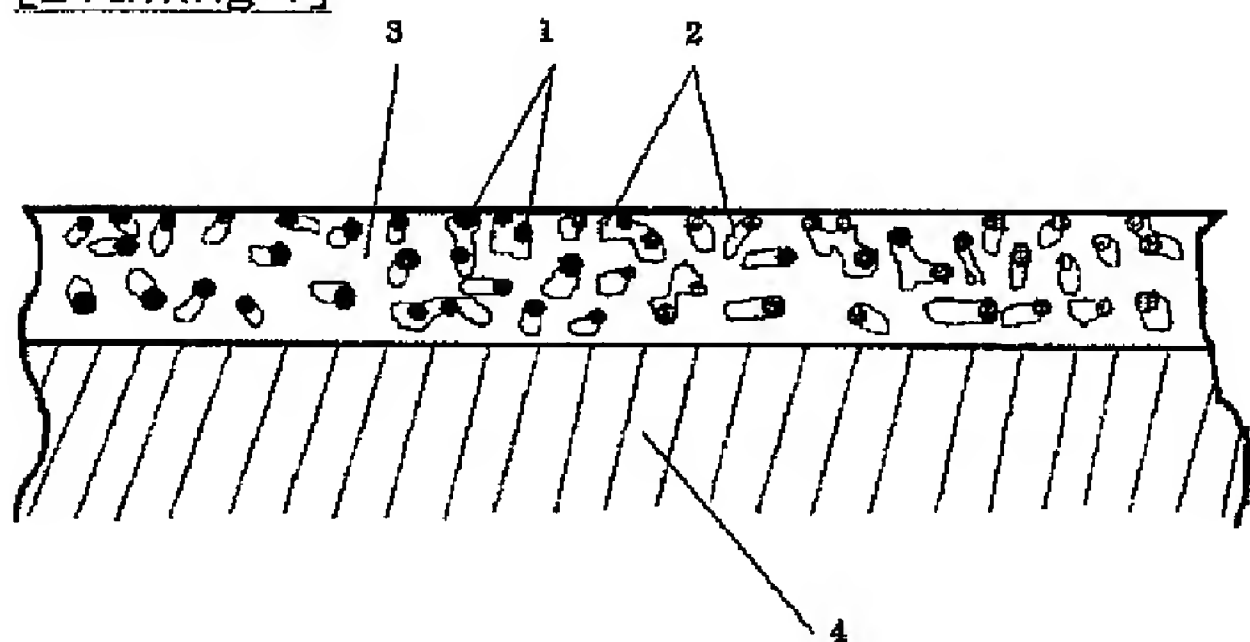
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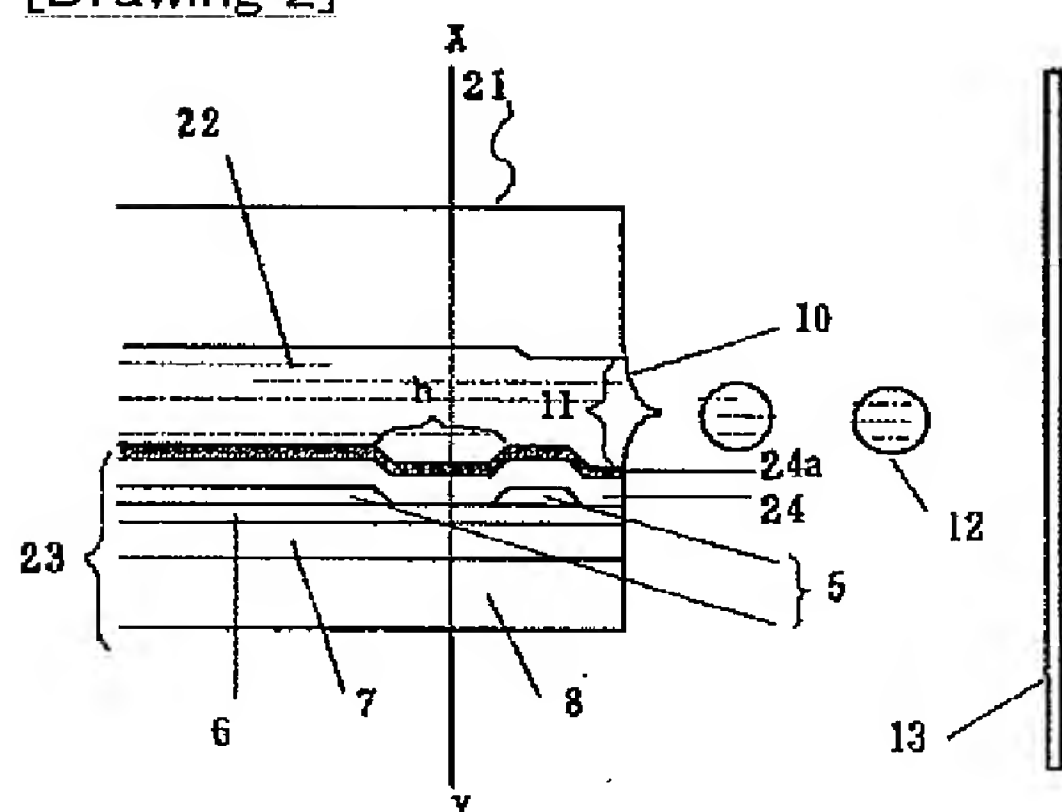
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DRAWINGS

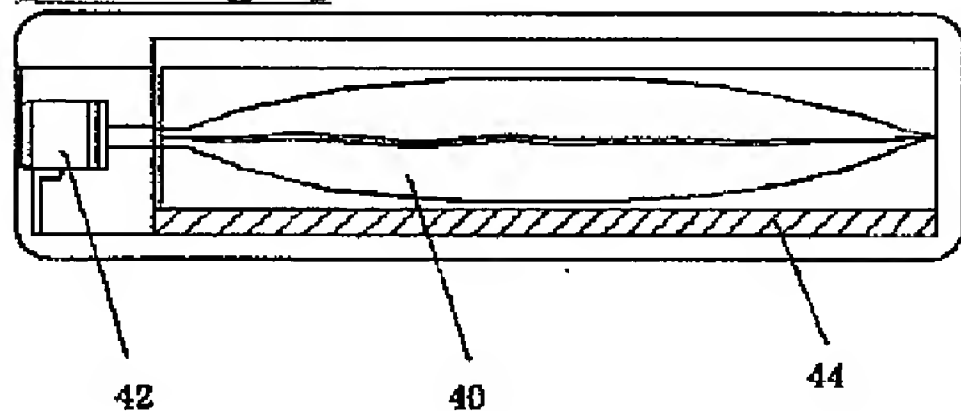
[Drawing 1]



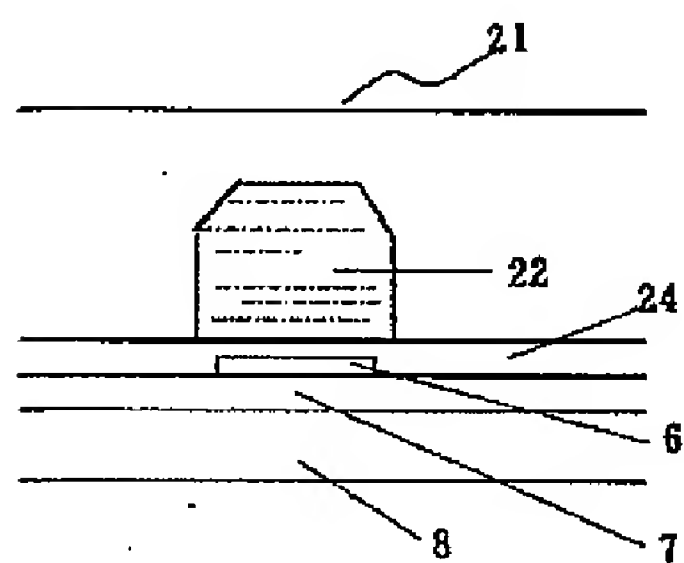
[Drawing 2]



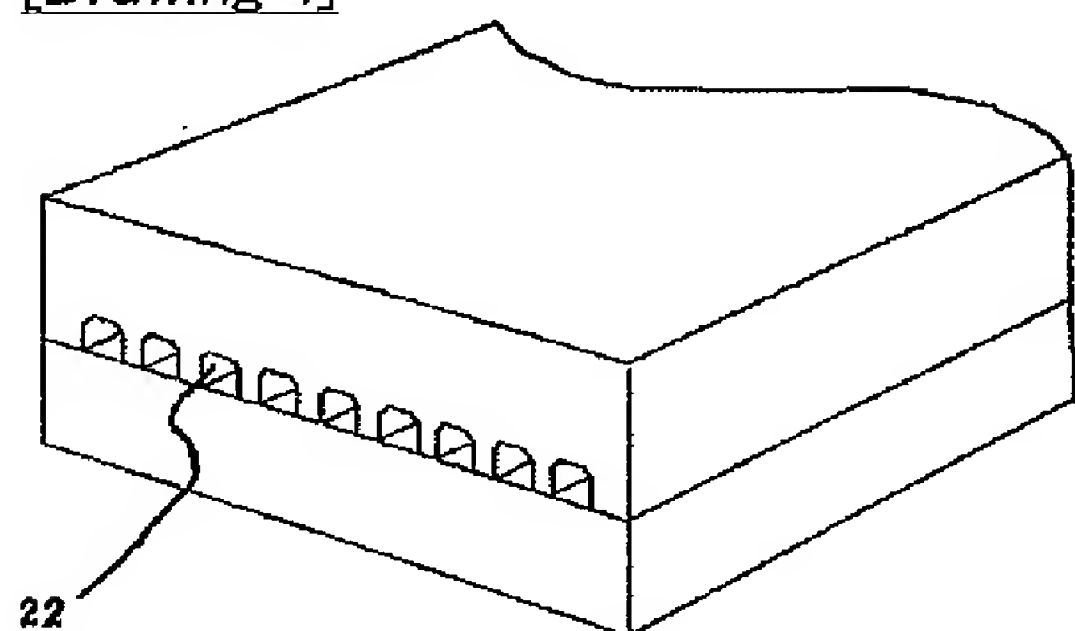
[Drawing 6]



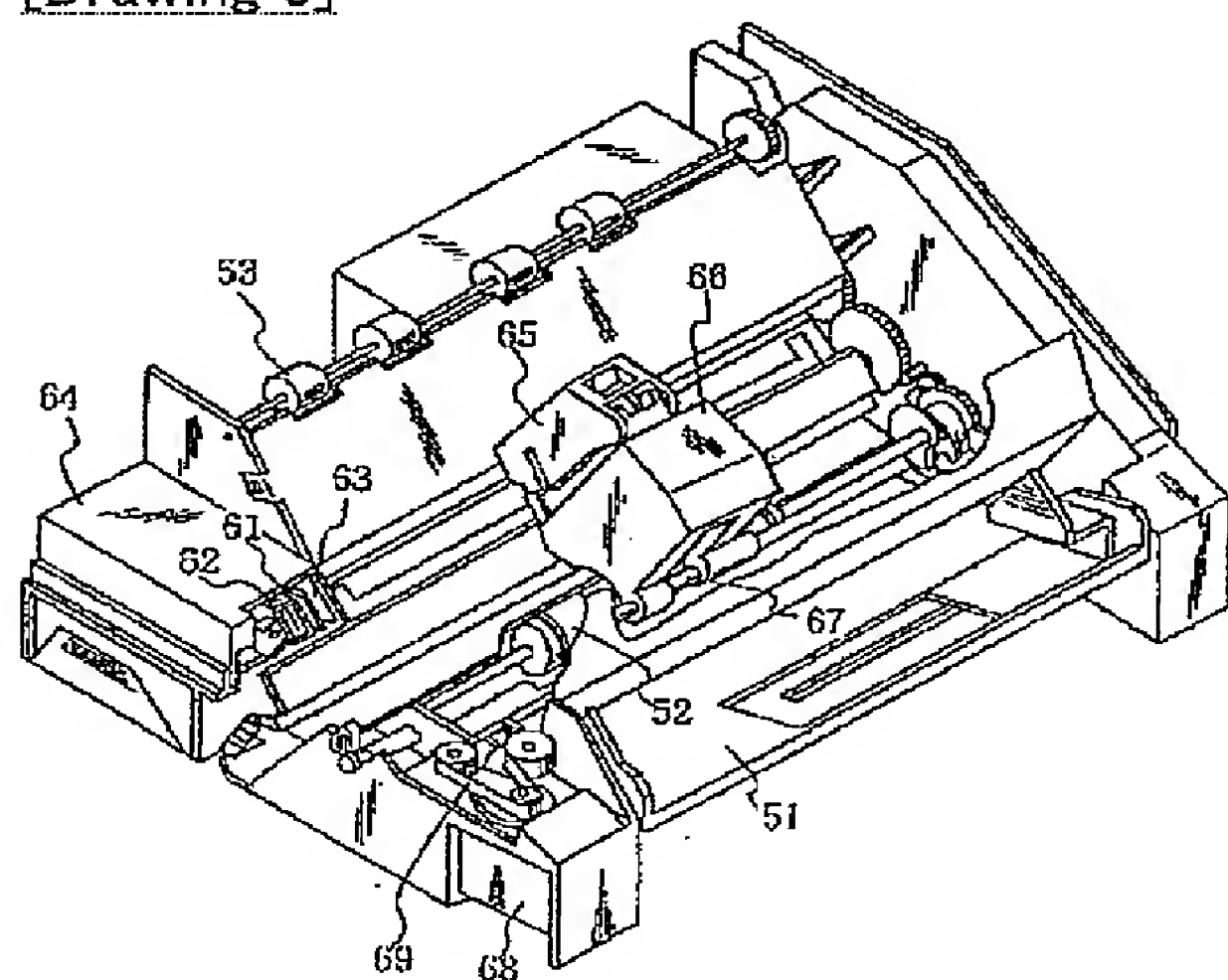
[Drawing 3]



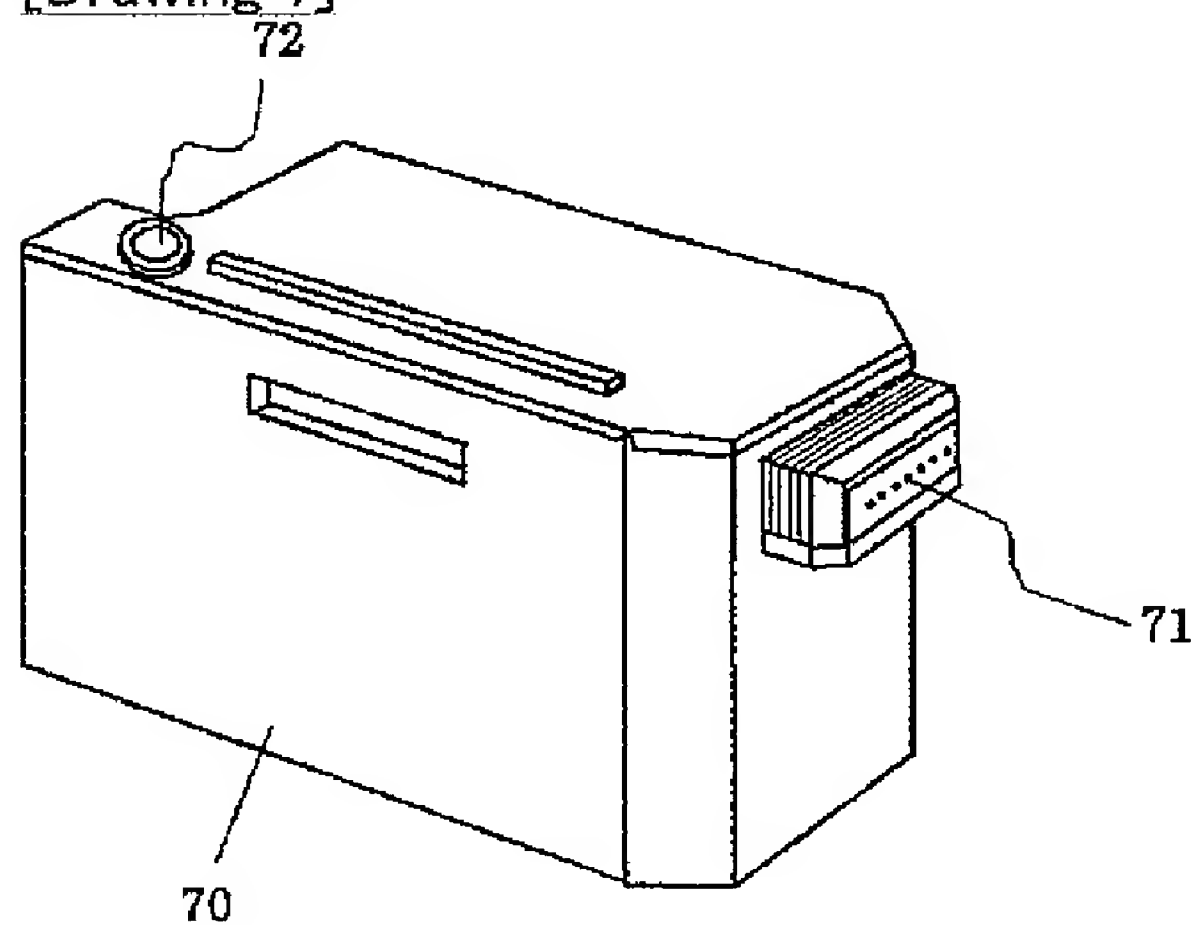
[Drawing 4]



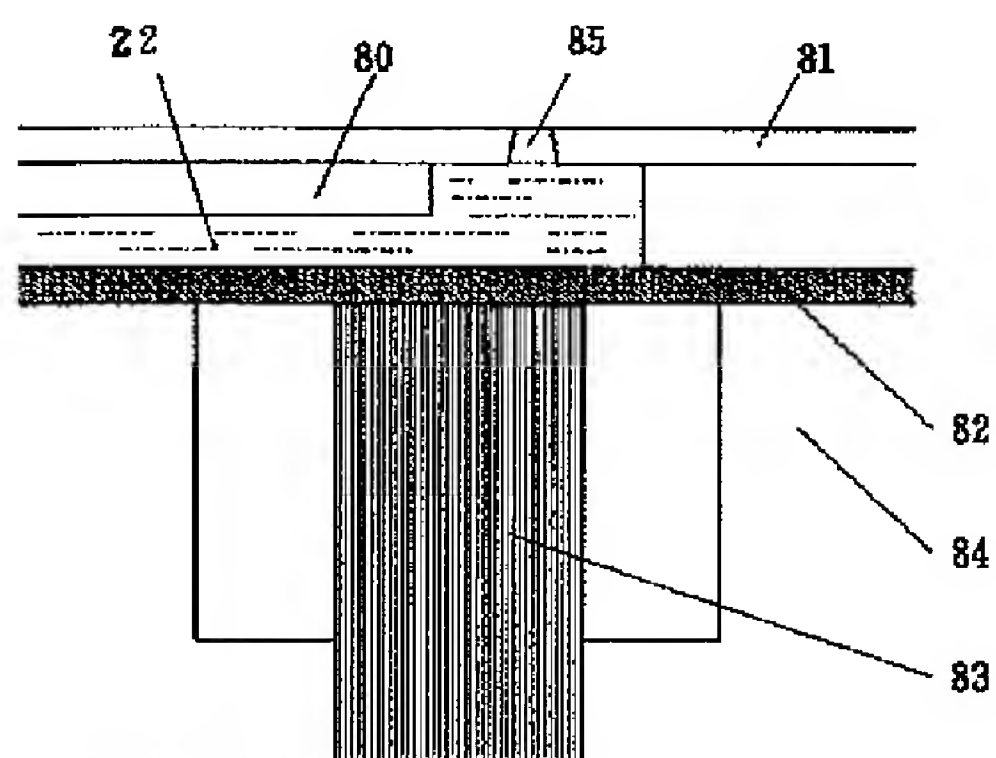
[Drawing 5]



[Drawing 7]

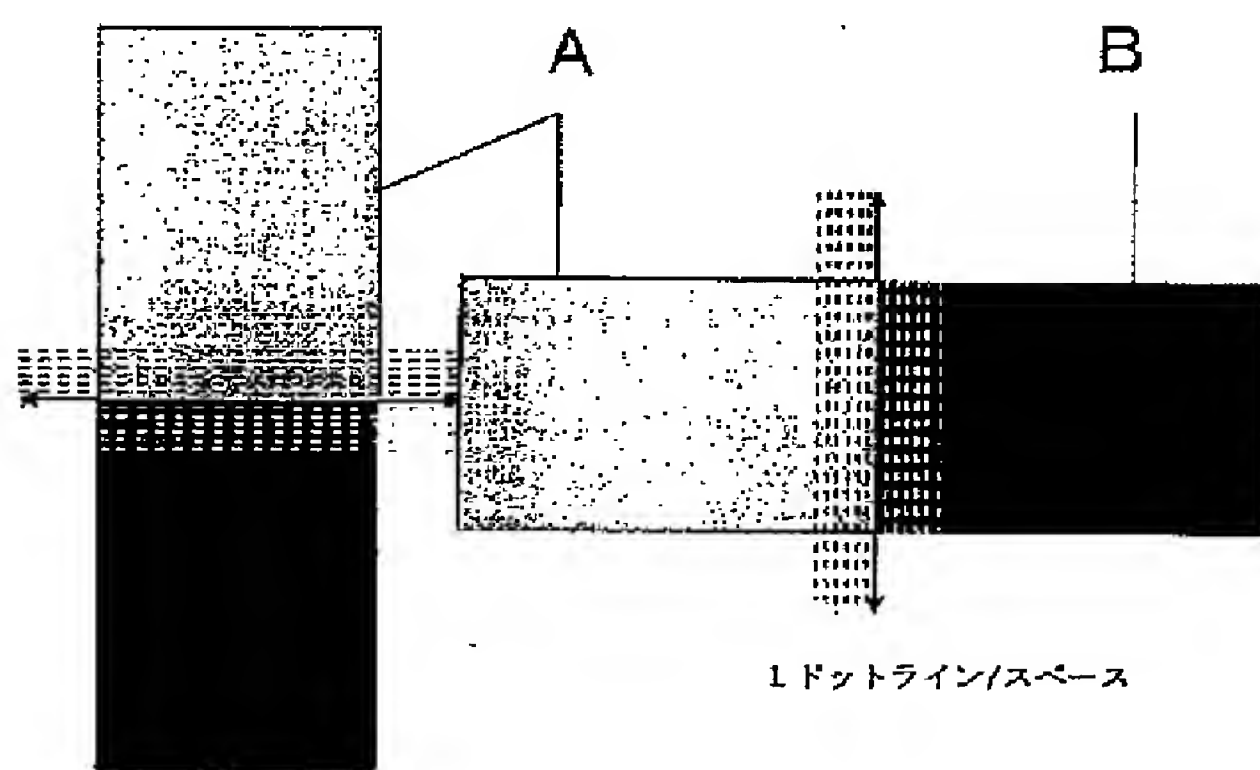


[Drawing 8]

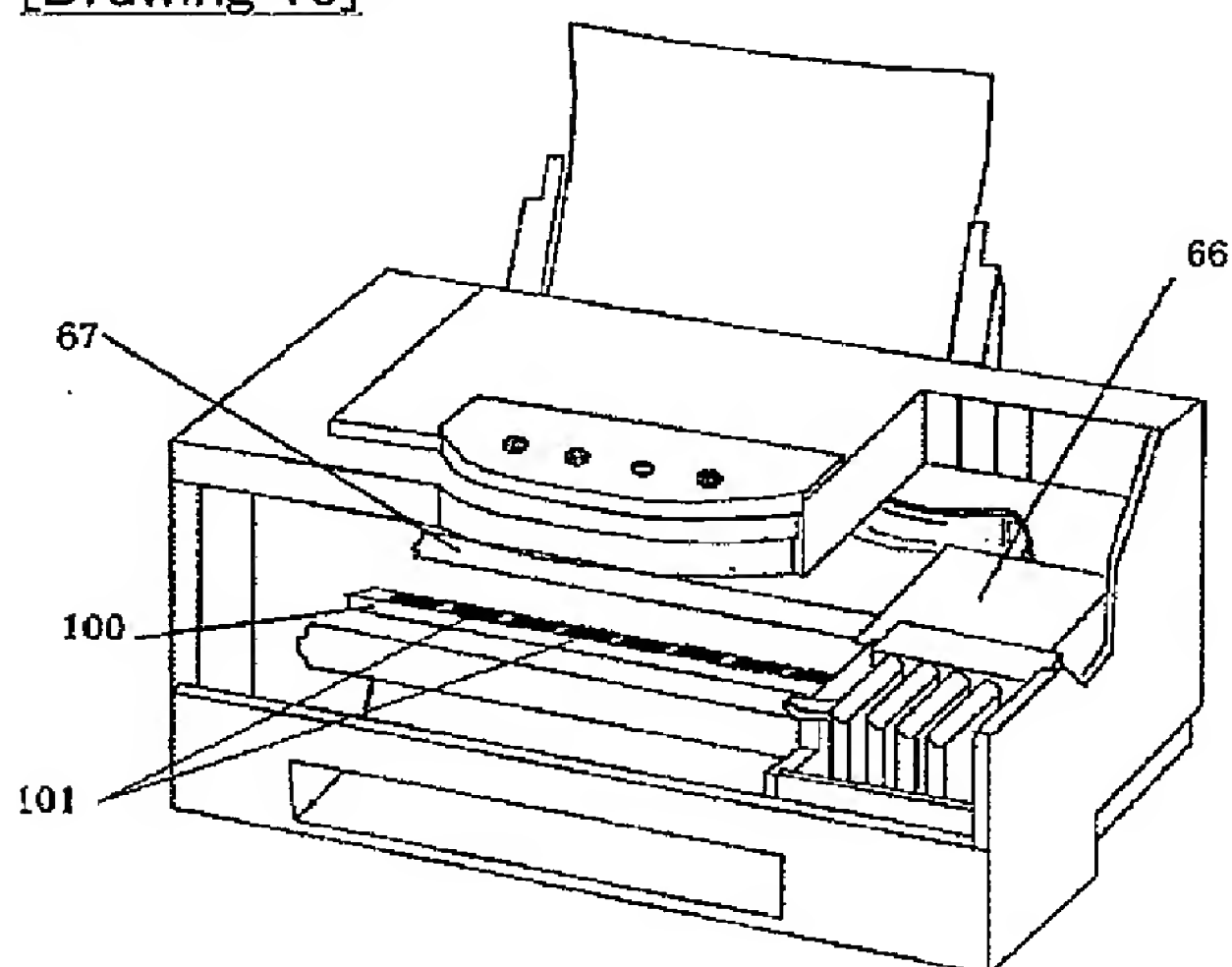


[Drawing 9]

印字方向



[Drawing 10]



[Translation done.]